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Yasuo Ohama

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EXAMINER

LAZORCIK, JASON L

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/523,319	Applicant(s) OHAMA ET AL.	
	Examiner JASON L. LAZORCIK	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/3/2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/3/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

Applicants reply dated April 3, 2009 amends independent claim 1 and cancels claim 5-8 which were previously withdrawn from consideration pursuant to the restriction election requirement dated July 10, 2008.

Claims 1-4 are claims 1-4 are pending for prosecution on the merits.

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-4 are provisionally rejected on the ground of nonstatutory

obviousness-type double patenting as being unpatentable over the amended

claims 1-3 of copending Application No. 10/555,853 dated April 7, 2008. Although

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the conflicting claims are not identical, they are not patentably distinct from each other.

3. Specifically, claim 1 of the noted application teaches a quartz glass crucible comprising a crucible base body or “an opaque outer layer” and an inner layer formed on an inside of the base body. Said inner layer comprises synthetic quartz glass extending from 0.15 L to 0.55 L and having a thickness in the range of 0.2 to 1.5mm as noted in claim 2. Said inner layer further comprises a natural quartz glass layer extending from 0.6 L to 1.0L as set forth in copending claim 3 and presents a thickness in the range of 0.4 to 5.0 mm.

4. Where the measurement of 1.0L is held equivalent to the claimed 1.0 H in the instant application, the copending claims 1-3 are understood to teach a crucible having a inner layer comprising synthetic quartz extending from the bottom of the quartz crucible to at least a height of 0.25H which reads upon the claimed “first part” and a natural quartz layer extending in the range of 0.5 H to 1 H which reads upon both the claimed “second part” and the “residual part” [claim 2]. The thickness ranges for the synthetic and natural quartz inner layers as discussed above are likewise understood to overlap and read upon the claimed ranges as required under the instant claims 3 and 4.

5. To the extent that the copending claims are silent regarding the claimed structure of the crucible base body, namely that the claimed body present “ a bottom part having a lowest side and a side wall having an upper end plane”, it is the Examiners position that such a crucible structure is either inherently provided in the copending claims or

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would have represented an obvious extension over the copending claims for one familiar with quartz crucibles

6. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. **Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabian (US 6,548,131) in view of Hellmann (US 6,306,489).**

(I) Natural quartz crucible with an inner layer of synthetic quartz is old and well known

10. Applicant admits (see Specification page 1, line 25 to page 2, line) that it is old and well known in the art to provide a quartz glass crucible having an inner layer fabricated from synthetic quartz glass. In view of this passage, it is understood by the

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Examiner that a crucible having a bottom part and cylindrical side wall with a synthetic quartz inner layer extending over the entire inner surface of said crucible (e.g. from the bottom to a height of $1.0H$) is old and well known in the art.

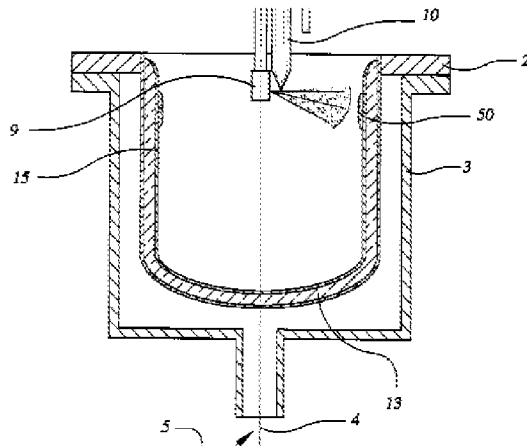
11. Similar to the above noted passage in Applicants Specification, Fabian teaches that quartz glass crucibles having the general form of a floor joined to a cylindrical side wall and comprising a base body of natural quartz with an inner layer formed from synthetic silica have been previously demonstrated in the art (col. 1, lines 15-42).

Fabian further recognized that providing a roughened surface on the inner layer of the crucible facilitates the early states of the silicon single crystal pulling process (see abstract and Col. 2, lines 4-43). Fabian states that this inner roughened layer is preferably located in the region of the starting zone and that "commonly the starting zone is in the upper third of the quartz glass crucible" (col. 5, lines 41-45).

12. With particular reference to the instant figure 5 (see excerpt below), Fabian teaches a crucible base body (13) having a bottom part having a lowest side and a side wall having an upper end plane. An inner layer (15) made of a synthetic quartz extends from the bottom to a height of $1.0 H$. A roughened surface (50) is provided in the upper third of the crucible (col. 5, lines 40-45) which effectively subdivides the inner layer into 1) a first part of inner layer (15) made of synthetic quartz and extending from the bottom to at least a height of $0.25 H$ and up to the roughened surface, 2) a second part provided in the upper third (e.g. approximately $0.66H$ to approximately $1.0H$), and a residual part (15) made of synthetic quartz and located between the upper terminus of the roughened surface (50) and the upper end plane of the base body (13). Regarding

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claims 3 and 4, the Fabian teaches that the synthetic layer (15) (col. 5, lines 29-34) and the roughened portion (50) (col. 7, lines 53-57) are both about 2.5 mm thick and that the roughened surface (50) may be formed upon or instead of the synthetic silica layer (15) (col. 7, lines 55-57).



13.

14. Fabian teaches that in order to fabricate the roughened surface, silica granulate is mixed with a low weight fraction of a compound (e.g. Si_3N_4) which decomposes during heating to release gases. After vitrification, the process results in a bubble containing surface layer (50) falling within the approximate "starting zone" for pulling a single crystal from a silicon melt contained within the crucible.

15. It is evident from the foregoing that Fabian teaches providing a high bubble content inner layer in the approximate region (e.g. $\sim 0.66H$ to $\sim 1.0H$) which overlaps the "second part" presently claimed by Applicant (e.g. $\sim 0.5H$ to $\sim 0.8H$). Fabian teaches a preferred embodiment wherein the roughened surface (50) is fabricated from a mixture of synthetic SiO_2 granulate and a trace amount of gas forming compound.

(II) Fabian is silent regarding use of natural quartz in roughened portion (50)

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16. Fabian is silent regarding preparation of the noted roughened portion (50) from "a naturally occurring quartz glass or .. of mixed quartz glass of naturally occurring and synthetic quartz glass" as presently claimed.

(III) Obvious to substitute naturally occurring quartz in roughened area (50) in view of Hellmann

17. The reference to Hellmann (US 6,306,489) teaches a similar structural arrangement to that treated in the Fabian reference above. With particular reference to the instant figure 2 excerpt, Hellman teaches a natural quartz base body (9) provided with an segmented inner layer comprising a natural quartz segment (14), a synthetic quartz segment (13), and a segment fabricated from a mixture of natural quartz powder and a gas forming compound (e.g. Si_3N_4).

18. Hellman further notes that "high purity quartz glass ... is relatively expensive" and that substituting lower purity natural quartz for high purity synthetic quartz represents an effective way to decrease manufacturing costs (col. 3, lines 61-64).

19. Although Fabian is silent regarding the use of natural quartz in the formation of the roughened region, the reference in no manner explicitly excludes its use in the fabrication of the quartz crucible. The reference to Hellmann teaches in a very similar process that natural quartz may be employed along with Silicon Nitride to form a high bubble content inner layer upon a natural quartz base body. Hellman further teaches that it is beneficial to replace synthetic quartz with the natural variant since doing so results in decreased manufacturing costs

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20. It follows that one of ordinary skill would find a reasonable expectation of success for fabricating the high bubble content “roughened zone” (50) from natural quartz instead of the preferred synthetic quartz in the Fabian crucible since a similar process has been demonstrated in the Hellmann reference. Further, one of ordinary skill in the art would be motivated to perform such a substitution as an approach to decrease manufacturing costs since such a benefit was explicitly contemplated in the Hellmann reference. It follows, absent compelling evidence to the contrary, that Applicants claimed invention constitutes a simple substitution of one known element (e.g. natural quartz) for another (e.g. synthetic quartz) to yield a predictable result, namely the high bubble content layer and that one of ordinary skill would have found it obvious to try said substitution in order to garner the noted decrease in manufacturing costs.

21. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima (US 5,306,473) in view of Matsumura (US 5,174,801).

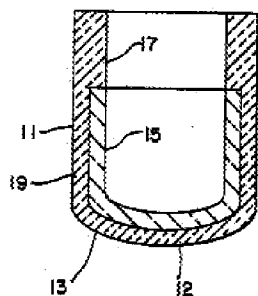
(I) Nakamura teaches a quartz crucible having an inner layer segmented by bubble content

22. Regarding claims 1 and 2 and with particular reference to the instant figure 2 (see below), Nakajima (US 5,306,473) teaches a quartz glass crucible comprising a crucible base body (19) comprising a bottom part (12) having a lowest side and a side wall (11) having an upper end plane. An inner layer comprising an opaque upper area opaque upper layer (17) and a transparent lower layer (15) is provided. The inner layer

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is noted to have "an average thickness ... ranging from about 25% to 40% of the total thickness of the crucible" (col. 5, lines 28-30). Regarding the inner layers, the reference teaches that the opaque area has a total volume of bubbles ranging from $7 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ to $30 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ (e.g. between 0.7% and 3% bubbles by volume) and that the transparent layer comprises less than $4 \times 10^{-3} \text{ cm}^3/\text{cm}^3$ (e.g. less than 0.4% bubbles by volume). Nakajima further teaches that the opaque inner layer extends within 75% or less of the total height of the crucible" with the balance of the inner surface characterized by the transparent inner layer.

23. With respect to Applicants claimed invention, Nakamura teaches a first inner layer part comprising transparent quartz and extending from the bottom of crucible to "at least a height of $0.25H$ " and up to a height of approximately $0.75H$ or more. Nakamura further teaches a second inner layer part comprising an opaque quartz material which extends approximately in the range of $0.75H$ to the upper end plane of the wall.



24.

(II) Nakajima is silent regarding the type of quartz used for the inner/outer layers

25. Nakajima is silent regarding the use of synthetic or natural quartz for formation of either of the inner layers or the outer layer of the crucible.

(III) Use of natural/synthetic quartz in the claimed manner for the inner layer of the crucible is obvious in light of Matsumura

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26. Matsumura teaches the fabrication of a crucible for pulling single crystal silicon substrates from a silicon melt. The reference teaches that it is known to use natural quartz for forming a crucible structure "having a lot of visible bubbles" and that it is likewise known to utilize a synthetic quartz material for forming "transparent" layers which are "substantially free from bubbles (see particularly col. 1, lines 15-44, and col 2., line 65 - col. 3, line 32). The reference further teaches a typical crucible size having a diameter of 14 inches and a wall thickness of 7.9 mm (see col. 8, lines 8-10).

27. It follows in view of the Matsumura disclosure, that a natural quartz material would have represented an obvious choice for forming the opaque quartz base body (19) and opaque quartz upper layer (17) since natural quartz is known to form an opaque glass structure having a relatively high bubble content as required by the Nakajima reference. Similarly synthetic quartz would have represented an obvious choice for the transparent lower layer (15) since such a material is known to form a transparent glass structure which is essentially free from bubbles and since such glass properties are again promoted in the Nakajima reference. At the very least, it would have been obvious for one of ordinary skill in the art to try the natural quartz for the base body and upper layer and synthetic quartz for the lower layer of the Nakamura since such materials would be reasonably expected to produce the desired bubble structures as required by the Nakamura disclosed crucible structure.

28. Further, Matsumura teaches a crucible wall thickness of 7.9mm and Nakamura teaches crucible inner layer thicknesses ranging from about 25% to 40% of the total thickness of the crucible, inner layer thicknesses (e.g. transparent or opaque inner

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layers) having a thickness in the range of ~1.9mm to ~3.2 mm would have been obvious to one of ordinary skill in the art. It follows that Applicants claimed ranges as set forth in pending **claims 3 and 4** overlap these ranges and would have been viewed as obvious to one of ordinary skill.

Response to Arguments

Argument #1)

With respect to the rejection of claims 1-4 over Fabian in view of Hellmann under 35 U.S.C. §103(a), Applicant alleges that Fabian does not teach the use of naturally occurring quartz on the inner layer (15) of the crucible and that modification of the Fabian reference by way of the Hellmann teachings is improper.

With respect to this position, Applicant first alleges (Applicants Reply, page 6) that the subject matter of the instant claimed invention, namely the problem of melt vibration, is "so remote" as to preclude one of ordinary skill in the art to apply any teachings from the Hellmann reference to a modification of the Fabian disclosed crucible.

The Examiner disagrees.

It will appear self-evident that, although the intended use of the Fabian and Hellmann references admittedly differ, the references are fundamentally related by the materials and methods employed in fabrication of the respective products. Applicant's observation that the Fabian and Hellmann products differ in an intended use or application in no manner detracts from the substantial similarities in both the methods

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and materials employed in the two references. In addition, it is noted that neither of the references either explicitly or inherently excludes a combination between the two. It follows that Applicants arguments alleging the one of ordinary skill in the art of crucible fabrication "would not avert to any teachings of the Hellmann" reference is held to be unpersuasive.

Argument #2)

Again with respect to the rejection of claims 1-4 over Fabian in view of Hellmann under 35 U.S.C. §103(a), Applicant acknowledges one of the stated influences which would lead one of ordinary skill to modify the Fabian crucible by the Hellmann reference, namely that substitution of the synthetic quartz of the Fabian process with the natural quartz used by Hellmann would present distinct financial advantages. In rebuttal, Applicant alleges that the cost of manufacturing the crucible is not as important an issue as suppressing of melt vibrations. In addition, Applicant alleges that even if the substitution were to be made for fiscal reasons as stated above, one of ordinary would "make the entire crucible inner layer of natural glass to reduce cost, not just a portion".

In response to applicant's argument that vibration suppression is more important than crucible cost, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Further, to the extent that Applicant alleges that a partial substitution of the synthetic glass layer would not yield the maximum cost savings, Applicant is advised that there is no requirement that a combination of references necessarily results in an maximum benefit in order for one of ordinary skill in the art for one of ordinary skill in the art to recognize a distinct utility in the combination. Specifically, Applicant admits that substituting natural for synthetic glass will in fact result in decreased materials costs, however one of ordinary skill would readily appreciate that the entire inner layer need not be substituted to achieve a real and beneficial reduction in crucible cost.

Argument #3)

With respect to the rejection of Claims 1-4 under Nakajima and Matsumura under 35 U.S.C. §103(a), Applicant alleges that there is no motivation to substitute the "naturally occurring quartz crystal powder" of Nakajima with the synthetic glass layer in Matsumura (see Applicants Reply pg 7, last paragraph).

Applicants position on this matter is acknowledged, however it is the Examiners assessment that Applicants arguments turn upon the presupposition that the "quartz crystal powder" as cited in Nakajima (col. 4, line 58) is indeed a naturally occurring quartz crystal powder as alleged by Applicant (see Applicants Reply page 7). In reality, Applicant was previously advised that Nakajima nowhere discloses the precise nature of the quartz employed in the fabrication of the crucible (see page 9, Official Action dated October 28, 2008). Further, Applicant has presented no evidence to support of the instant allegations. It therefore follows that, since Applicant has provided no conclusive

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evidence in support of the instant allegations, said allegations are held to be mere conjecture and attorney argument.

The Official policy regarding Attorney argument is clearly outlined in MPEP §2145 [R-3];

“Attorney argument is not evidence unless it is an admission, in which case, an examiner may use the admission in making a rejection. See MPEP § 2129 and § 2144.03 for a discussion of admissions as prior art. The arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997) (“An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of obviousness.”). See MPEP § 716.01(c) for examples of attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration.

Further, Applicants arguments predicated upon these unsubstantiated allegations are held to be moot.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references to Nakajima (US 5,306,388), Hansen (US 5,980,629), and Sato (US 6,136,092) are all deemed to be closely related to Applicants claimed crucible structure. Any reply to the instant Office Action should carefully consider the scope and content of each reference in comparison with Applicants claimed invention.

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29. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON L. LAZORCIK whose telephone number is (571)272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/
Supervisory Patent Examiner, Art
Unit 1791

/J. L. L./
Examiner, Art Unit 1791